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MEDICAL RESEARCH IN THE TURKMEN SSR

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MEDICAL RESEARCH IN THE TURKMEN SSR

[Following is a translation of three articles in Zdravookhraneniye Turkmenistana [Public Health in Turkmenistan], Vol IV, No 4, Ashkhabad, 1960. The authors and pages in the original source are given at the beginning of the individual articles.]

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THE ACTION OF SMALL DOSES OF X-RAYS ON PERIPHERAL BLOOD CIRCULATION

/Following is the translation of an article by V. V. Slesarev, head of the Chair of Roentgenology and Medical Radiology of the Turkmen Medical Institute imeni I. V. Stalin, pp. 32-36/

In recent years in experimental as well as in clinical work, much attention has been given to the effect of small doses of ionizing radiation on the vascular system.

Among the various methods for investigating the circulatory and lymphatic vessels, much importance has been given to the contrast X-ray method, that is, to angiography and lymphography. This method permits one to collect the objective documentation on the anatomical-morphological as well as the functional changes in the circulatory and lymphatic vessels.

B. N. Mogil'nitskiy, and P. N. Mazayev (1949) studied the permeability of the circulatory vessels with the aid of a vasographic method under the local radiation of dogs' extremeties with a dosage of 2000 roentgens.

P. N. Mazayev, by using a series of vasographs conducted in vivo on a dog, studied the anatomical-functional condition of the peripheral vessels when subject to local X-raying in doses from 500 to 5000 roentgens. On the vasogram there was recorded a contraction of the artery lumen, a retardation of arterial and venal blood circulation and an increase in the permeability of the vascular wall which was shown in the diffusion of the contrasting substance beyond the vascular channel.

We took upon ourselves the task of determining the influence of small doses of X-rays on the peripheral circulation and lymphatic vessels. Our experimental research was carried out on ten dogs.

The test animal was given a roentgenovaso- and lymphograph before X-raying. In order to get a depiction of the circulatory vessels, we employed a 50% solution of cardiotrast (5-6 m. of this solution was injected into the femoral artery into the blood flow). The lymphograph was taken by the means of an injection of 2-3 m. of thorotrast into the soft tissue of the foot, and from here the contrasting substance was carried into the lymphatic vessels. Seried photographs were taken with the aid of a tunnel

adapter; we took 6-9 photographs at intervals of 0.5-1 seconds. In order to record the progress of the lymph along the efferent lymphatic vessels, that is, in the proximity of the popliteal node, the interval between photographs was extended to 3-5 seconds. The X-ray technical conditions were: 65-70 km., 40mA with an exposure of 0.1 to 0.3 seconds.

The dogs were placed in a special stand with an arresting device and radiated simultaneously from both sides with the aid of a RUM-3 X-ray machine. Uniformity in the general X-raying was achieved by increasing the focal length to 120 cm, with 180 kw. 15 mA, a filter of 0.5 copper plus 1 mm aluminum, the strength of the dose was 7 roentgens in both tubes, and the general dose 2 roentgens.

Ten minutes and then again 24 hours after the X-raying, controlled roentgenovasographic and lymphographic research was made on the same extremity. The methodological conditions were the same.

In using this method of a seried roentgenovaso- and lymphographs, we were able to study the anatomical-topographical peculiarities of the circulatory and lymphatic vessels and as well the character of the vascular reaction to the effect of small doses of X-rays.

In doing so, we took into account the condition of vessel tonus, the speed of blood and lymph flow, and also the permeability of the circulatory vessels.

For an illustration of this, we give here the data on the roentgenovaso- and lymphographic reseach from the hind extremity of a dog before and 24 hours after the simultaneous total X-raying of the animal with a dose of 2 roentgens (See Fig. 1) /All photographs at end of article/.

In Figure 1-a, the contrasting substance has filled the femoral artery, its branches and the arteries of the lower leg. After the injection of the contrasting substance into the pad of the foot, the superficial and deep afferent lymphatic vessels are visible, along which are placed the bead-like thickenings (the valvular synusa) and the regional popliteal node. The superficial lymphatic trunks are parallel, and close to the popliteal node, they anastomose one with the other.

In Fig. 1-b, the arteries do not contain any of the contrasting substance, since at this phase of the research it had entered the veins of the extremity including the femoral vein. As before, the afferent superficial and deep lymphatic vessels are well defined. Along with this one can detect the efferent lymphatic vessels in the area where they leave the popliteal node.

In Fig. 1-c, one can make out the traces of the contrasting substance in the large veins, but the small peripheral veins are not visible.

The lymphatic vessels give a clear contrasting depiction. Their direction corresponds to the course of the circulatory vessels.

In Figs. 1-d, 1-e, the circulatory vessels do not show, for the contrasting substance is not found in them.

In the lymphatic vessels one can see the advance of the contrasting substance along the efferent lymphatic paths.

In Fig. 1-f, one finds the clearest depiction of the afferent superficial and deep lymphatic vessels. The popliteal node and the efferent lymphatic vessels are enmeshed, consist of several trunks, and communicate one with the other, but at the level of the haunch they form one general trunk which goes toward the iliac nodes.

From the vaso-lymphograms given here it is evident that the superficial afferent lymphatic vessels lie next to the vena saphena, while the deep lymphatic vessels are next to the vessels of the lower leg; the efferent vessels follow the course of the femoral arteries and veins.

In the seried photographs which were taken 24 hours after the total radiation (dose 2 roentgens), we were able to notice the following:

In Fig. 2-a, the arteries of the extremity are visible. The diameter of the lumen in the large arterial trunks preserve the same size as under normal conditions. The arteries of middle and small caliber have enlarged. The entrance of the contrasting substance into the veins of the lower leg is observable. The popliteal lymphatic node is enlarged.

In Fig. 2-b, there are again some traces of the contrasting substance in the veins. The small and large veins are clearly defined. The arteries and veins do not have any of the contrasting substance. The progress of lymph is retarded.

Thus, under the influence of total radiation in small doses of X-rays on test animals, we found an increase in the speed of arterio-venal circulation in the peripheral vessels. The popliteal lymphatic node is enlarged. The lymph flow has slowed down.

For an illustration of the vascular reaction immediately after total radiation of an animal in small doses (2 roentgens), we give here the data from the vasographic studies before and 10 minutes after X-raying.

In Fig. 3-a of the seried vasograms which were taken before radiation of the extremity of the dog, one can see the femoral artery, its branches, the popliteal artery and

The veins are not differentiated. In Fig. 3-b, arteries of the extremity -3- cluding the small veins, also the peripheral and trunk veins (femoral vein) are

others. The veins are not differentiated. In Fig. 3-b, the arteries of the extremity, including the small veins, but also the peripheral and trunk veins (femoral vein) are visible. In Fig. 3-c, the arteries do not have any of the contrasting substance, with the exception of the smallest branches. The small and large veins are clearly visible.

Ten minutes after radiation (dose 2 roentgens), the same animal was given the second same vasographic study.

In Fig. 4-a of the seried vasogram, in contrast to the normal conditions, we could make out not only the arteries, including the small branches, but as well the entrance of the contrasting substance into the peripheral branches of the vein. The femoral vein still did not contain any contrasting substance.

In Fig. 4-b, along with the arteries, the veins are clearly visible, including the femoral.

In Fig. 4-c, the arteries are free from the contrasting substance, and it is found only in the large veins.

From a comparison of the seried vasograms which were taken before total radiation in small doses and ten minutes thereafter, it is possible to establish the following: the speed of blood circulation in the arteries and veins of the studied extremity had markedly risen; the large arteries preserve their previous diameter; the small vessels have enlarged, and the amount that each of them increases is at the expense of including additional vessels in the blood circulation; in comparison with the normal condition, the lumen of the veins is significantly expanded and as such the venal valves are also visible.

Thus the in vivo seried vaso-lymphography provides an opportunity to take into consideration the functional condition of the vascular system, but most importantly, the vessel tonus, the speed in the blood and lymph flow, the inclusion into the blood circulation of vascular "reserves" and the permeability of vascular walls. Under the influence of a single total radiation in small doses (2 roentgens) the artery lumen of the middle and particularly the small caliber vessels expands, there is a marked increase in the lumen of the veins, the speed of arterio-venal blood circulation rises, the progress of lymph is retarded, and the popliteal lymph node becomes greater in size than under normal conditions.

Our experimental research was directed to the study of vascular reaction not only under a single total effect of the small dose, but also under repeated X-raying.

The condition of hemodynamics and also hemorrhagic diathesis which occurs after the effect of ionizing radiation, is closely related to trophic destruction and to a change in the permeability in the vascular wall. There-

fore, further study on the vascular reaction under the condition of multiple total effect on the organism of small X-ray doses will provide an opportunity to study some of the basic features in the pathogenesis of radiation sickness.

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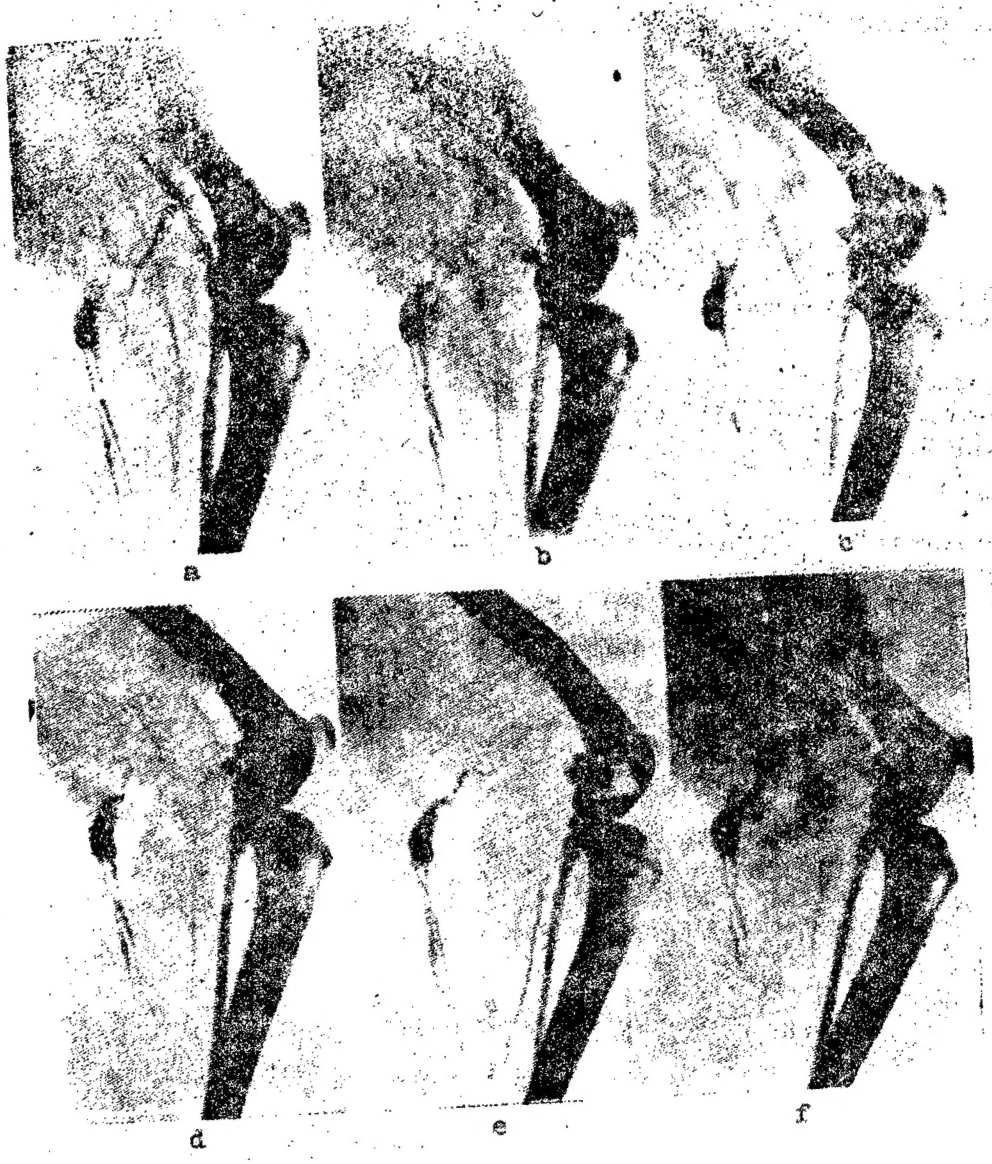

Fig. 1

Fig. 2

Fig. 3

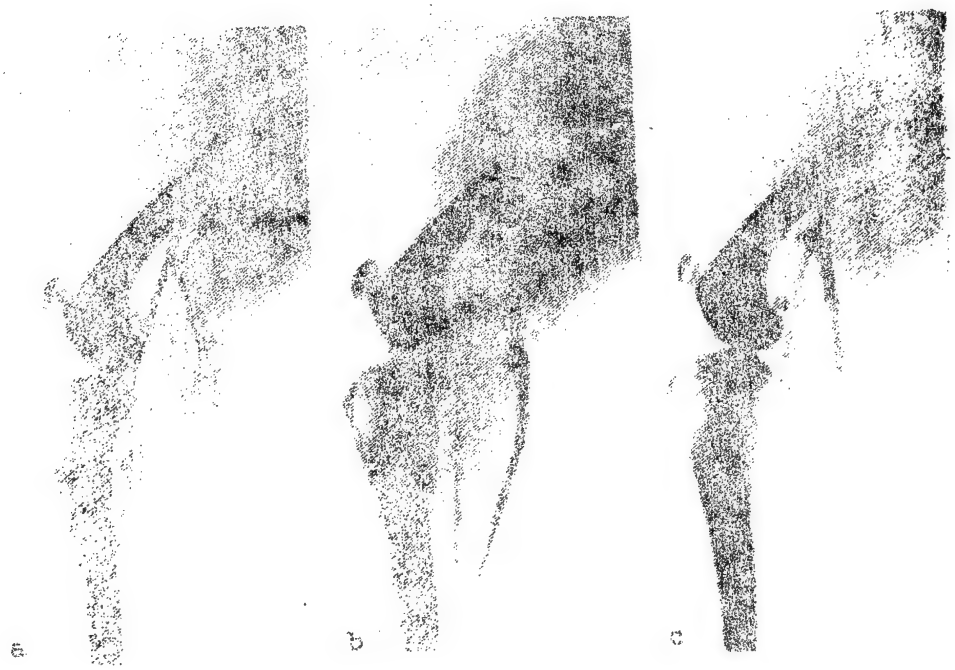

Fig. 4

AN EXPERIMENT ON CONTROLLING DYSENTERY IN A LARGE CITY

/Following is a translation of an article by O. N. Kuliyeva and A. F. Kazak, pp. 39-42./

The question of combatting dysentery in a large city remains even now a pressing one. Therefore we decided to share the results of our experience which was gathered in the process of carrying out a group of anti-dysentery measures in one of the new cities in Turkmenistan.

The observations were begun in 1949. The epidemiological situation at that time was unfavorable and complicated by the large influx of the population due to the construction of the town. The index of dysentery infection per 10,000 inhabitants was 316 in 1950.

The lack of treatment-prophylactic and sanitary-anti-epidemic facilities did not permit us to simultaneously hospitalize the sick and systematically and thoroughly carry on sanitary and hygienic measures. The struggle against dysentery basically was carried on during the period of its seasonal increase and concluded with the curing of those who came to us.

Decisive measures were needed to create an awareness of the sanitary and hygienic code in the town and to increase the treatment and prophylactics of dysentery.

During 1951-1953, a group of expeditions from the Institute of Epidemiology and Microbiology imeni Gamaley in the Academy of Medical Science of the USSR /AMN USSR/ worked in Turkmenistan. They were of great assistance to the medical workers in studying the particular features in the epidemiology of dysentery and in organizing anti-dysentery measures.

One of the chief causes for the spread of dysentery was the lack of potable water. At the beginning, the city was supplied with water which had been trucked in. Later an aquaduct was built. However even then the water supply was insufficient. Water was available only at certain times of the day, and it was improperly chlorinated. In addition, the one aquaduct was used for both industrial and drinking water, and this led to its dirtying and a lowering in the coli-titre. The reserves of industrial water were kept in open cisterns which were placed in various

areas of the city. This water was used both for fire-fighting and for bathing. Bacteriological research made at that time on tests of the water from such cisterns showed strong contamination with intestinal bacilli.

The unsanitary condition of the city and the surrounding workers' settlements also promoted the spread of dysentery. The collection, storage and disposal of garbage was carried on with flagrant violations of the health code. The existing garbage cans did not come up to the sanitary or technical standard, and were placed directly on the ground without an impermeable base or over a drain without lids. All of this led to an abundant increase in flies.

Observations on the number of flies were carried out by the workers from the expedition of the Institute of Epidemiology and Microbiology of the AMN USSR. They found the maximum number of flies in April-May, but beginning with June (in connection with the high air temperature 45-48° and soil temperature, 60-70°) there was a sharp decrease. At the end of August and in September once again the fly population began to grow.

Bacteriological research on the contents of the intestines of the flies and larvae showed dysentery bacteria.

Public eating places and the wholesale-retail network also played a definite part in the epidemiology of dysentery as their locations and rooms in the majority of cases did not come up to the sanitary and technical demands. The technological processes for preparing the food frequently were not observed, the working places were not always kept clean, nor were the dining rooms in restaurants, the area around the courts in back or the streets in front. The struggle against the flies was conducted extremely poorly.

A source of the rise in the outbreak of dysentery among the participants of the FZO* in 1951 were the workers in the institutions of public eating. Upon investigating the dining places and the retail stores, 15 carriers of bacillus were found. Carriers were also found in the kindergartens, nurseries, etc. (see Table 1, compiled according to the materials of the expedition of the AMN USSR).

Table 1

Carriers of Dysentery Bacteria of Those Checked in 1951

Infected and Contacts	Workers in				
	Nurseries	Kinder-gartens	Schools	Public Eating	Medical Institutes
27.15	19.0	17.5	10.0	18.8	11.8

[* FZO: Fabrichno-zavodskoye obucheniye = Industrial training.]

The high percentage of bacteria carriers who did not suffer from an intestinal upset among the workers in the food and children's institutions was also one of the particular features of the epidemiology of dysentery.

At present the struggle against dysentery got under way at the end of 1951. As the basis for all of the work we took a general complex of measures designed to meet the local peculiarities in dysentery epidemiology; in each of these the main attention was focused on its thorough application throughout the year (without slackening the work between seasons: from October to April.)

The application of these general measures was preceded by the organizational period. During this time the bacteriological laboratory was strengthened and expanded in the municipal sanitary-epidemiological stations, supplies of drugs were provided for, a department for intestinal infections was set up at the municipal hospital, and the city was civided into individual areas to which were attached the medical workers from the hospital and sanitary-epidemiological stations of the "oblast'" and city. Physicians from all specialties (surgeons, phthysiatrists, neurologists, occulists etc.) were attracted to take part in the work.

A general plan was set up which provided for the improvement of the town's sanitary condition, the systematic observation for sources of infection, the active search for patients with chronic dysentery and bacteria carriers, the total hospitalization of all patients suffering not only from dysentery but from intestinal disorders as well, the systematic carrying out of conclusive, continuous and prophylactic disinfection, and the constant follow-up examinations for those earlier afflicted until their complete recovery.

This plan was discussed by the medical community with the wide participation of the Party and Soviet workers.

In addition to the general plan we drew up a perspective plan for a suitable sanitary system for the town which would include such measures as the refitting of the aquaduct, the construction of sewage, a new bread factory, refrigeration plant, and a packing house.

With the aim of bettering medical services, the provisions for in patients were expanded, and the treatment and prophylactic institutions were staffed with cadres of medical workers. In Table 2 we give the index for the number of physicians, middle medical workers /feldshers, nurses, etc./ and also hospital beds per 1000 inhabitants over the years.

Table 2

	years			
	1948	1951	1955	1959
Physicians	0.63	1.2	1.43	1.57
Middle Medical Workers	1.60	3.2	4.71	5.81
Hospial Beds	2.33	7.7	10.66	11.12

Along with the bettering of medical services we brought order into all of the communal and private dwellings in the town and especially into the headworks and the cisterns for industrial water. Since 1952 the water factor has lost its importance as a source of infection.

Carrying out on a wide scale such sanitary-educational work has not only lifted the general level of sanitary-hygienic knowledge in the population, but as well has enabled the people themselves to participate actively in the measures against dysentery (such as the disclosure of ill peoples, hospitalization, disinfaction, simultaneous attentiveness to bad conditions, maintaining the cleanliness of courtyards, working areas, etc.)

Since 1951 we began to undertake more decisive measures for controlling the flies by the means of regular removal from the city and settlements of garbage, the improvement and building of new health centers, the disinfection and oiling of lavatories and cesspools, etc. In the subsequent years this has visibly reduced the number of flies.

In 1959 with the active guidance of the Soviet and Party organs we introduced a six-field system for working the municipal dump. It is carried out in the following manner. The territory of the dump is divided into 6 fields (squares) with a size of 20 x 30 m^2 each. During the day the garbage is carried out to one of the fields, on the next day to another, and so forth until the end of the week. Then a grader covers the refuse with a thin layer of earth and then feul oil is poured on, 2 liters per square meter and lit. We get very good results from this.

A thorough carrying out of these measures throughout the entire year has notably reduced the bacteria count. Even in 1953 the bacteria count was minimal.

Gradually the face of the town has changed. The blocks are lined with comfortable houses; the streets and sidewalks are asphalted, greenery is rapidly springing up in the town, new health centers are being set up and built,

typical locations for dining rooms, stores, produce warehouses and vegetable markets are being reparied and built, a bread factory, the refrigerating plant, the public bath are under contruction, and the headwork of the aquaduct is being re-equipped and enlarged. In 1958-1959, the colititre for drinking water reached 333 and more.

We have also seen the building of new typical facilities for treatment-prophylactic institutions (a hospital, maternity home, a sanitary-epidemiological station and a pasteurizing plant), children's institutions, etc. Almost all of the houses are connected to the sewage system and are equipped with gas heat.

There has been a significant expansion in the network of market-places, public eating places, etc., and the supplying of vegetables and milk has been systematized.

All of this enabled us even in 1953 to lower by two times the occurrence of acute as well as chronic dystentery; in 1956 it had dropped by 5 times.

However the existing level of spradic infection for this well-designed and well-run city is still high.

A further drop in dystentery is hindered by the fact that the complete realization of the measures is not yet satisfactory in the inter-season period, particularly among the children. The data on infection occurrence for 1958 is witness to this, for 44.2% of those afflicted were children under three.

In 1959 particalar attention was given to the sanitary situation of the town. In January the obligatory decision of the Gorispolkom /Municipal Executive Committee/ entitled "On measures for bettering the sanitary situation" was published; in March "On the sanitary Monthly report," in April "On the regulating of the work of the town dump," and in May "On the measures for the struggle against gastric-intestinal diseases."

The control for carrying out all of these prophylactic measures was done by the anti-epidemic staff which was organized under the Gorispolkom.

During the summer and fall the staff accomplished a great deal. To each block of the city was assigned one physician and one middle medical worker for checking the sanitary condition and for conducting sanitary-educational propaganda; also each block has a representative from an enterprise (or institution) for giving assistance in sanitary techniques. There has also been a strengthening in the work on the organization of a sanitary "aktiv" /a group of political activists/ and the recruitment of members for its practical work. The entire town has been treated three times with hexochloran and a DDT emulsion.

The staff gives a great deal of attention to sani-

tary observations for the loci of infections and to conducting the measures for eliminating them (laboratory research and the treatment of people in contact with the disease, sanitary-educational work, spraying, etc.)

As a result of all this the indidence of acute dysentery in 1959 was two times lower than in 1958.

THE APPLICATION OF ATOMIZERS IN THE APK DISINFECTION CHAMBER

[Followinggis the translation of an article by I. Petrichenko, p. 43]

For use in daily disinfection, the chamber disinfection method has found wide use.

Disinfection chambers are used in sanitary-epidemiological, disinfection and anti-plague stations, and also in municipal, town and rural hospitals and other treatment-prophylactic institutions.

The mobile and stationary paraformaline APK chambers are considered the best type. However they are designed for use with hard fuels only, and in the conditions of our Republic this makes them unsuitable and too expensive. There have been instances when conclusive disinfection was stopped due to the absence of firewood in the sanitary-epidemiological stations (the cities of Krasnovodsk, Nebit-Dag, Cheleken, Ashkhabad, Gasan-Kuliyskiy, Zizyl-Atrekskiy and other rayons).

In Turkmenistan there is a sufficient supply of liquid fuels such as kerosine and other petroleum products.

We gave ourselves the task of converting a stationary APK chamber to liquid fuel, without altering its structure. With this task in mind we made a simplified atomizer from standard shaped parts for injecting the liquid fuel. It has been designed for service in burners which are short, that is exactly for those such as the APK chambers (37 cm.).

The atomizer is of small dimensions and is comparatively light in weight. The length of the atomizer is 46 cm., and the diameter of the opening at the outlet is 9 mm. It is fastened with a draw nut to the fore wall of the burner, and to the lower edge of the burner opening with a small fitting beneath so that the door may close. The fuel oil travels along a pipe, which connects the atomizer to the chamber valve; the "atmosphere" enters the burner between the walls of the atomizer opening and the pipe which bring in the fuel. The pipes of the vaporizer are protected from the flames by a metal sheet which is cut from the bottom of a metal barrel.

Taking care of the atomizer is extremely easy.

The observations which were made in the process of its practical work (from December 1959 to August 1960) have shown that the firing of the boiler and getting up steam of 2 atmospheres takes on the average of 12 to 16 minutes under the conditions of even and complete burning of the liquid fuel. Preparing the same chamber for work when using firewood (haloxylon) takes a good deal longer (1 hour or more).

Characteristic for the atomizer is that it can function in the absence of pressure in the boiler. A broad jet and good atomization of the fuel begins even when the pressure is equal to 0.1 atmospheres on the manometer index.

At one working of the chamber (in a store-room) on an average it uses 5 kg. of kerosine or oil waste products from a car (lubricating oil) instead of 40-50 kg. of haloxylon, that is, this makes it 5 times cheaper. It significantly lessens the work of the people servicing the chamber.

A chamber with an atomizer can work on liquid as well as on solid fuel.

The atomizer described above can be recommended for use in the existing APK chambers. It is not complex in its structure, and can be easily made with the equipment at a small garage or mechanical workshops.

In the aim of fire prevention in adapting the chamber to liquid fuel, it is necessary to strengthen the insulation which can be put between the walls of the chamber and the burner (sheets of asbestos, etc.).

In areas where there is gas heating, the stationary disinfection chambers with atomizers can be adapted to gas, as has been done at the Nebit Dag sanitary-epidemiological station.

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